Rhodora

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Conducted and published for the Club, by

BENJAMIN LINCOLN ROBINSON Editor-in-chief.

FRANK SHIPLEY COLLINS
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HOLLIS WEBSTER } Associate Editors.

WILLIAM PENN RICH
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1911

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DAVID PEARCE PENHALLOW.

WALTER DEANE.

(Read before the New England Botanical Club, December 2, 1910.)

IT is my sad duty to record once more the death of one of our number, a man who won marked distinction as a student of fossil plants, Professor David Pearce Penhallow, a non-resident member of The New England Botanical Club since November 6, 1896. For many years connected with McGill University in Montreal, Professor Penhallow has been considered by many rather as a Canadian than otherwise, but this was far from the truth. To the end he was a loyal citizen of the United States to which he returned regularly to cast his vote.

Although unable to be present at our meetings except on rare occasions, he took a keen interest in all our proceedings, was a devoted reader of RHODORA, and we were fortunate in having an article from his pen appear in the September number of our journal for 1909. This article, 'An Account of certain noteworthy features in the habitat of Rhodora,' was suggested the previous summer by an investigation of a peat bog in process of development in Shelburne, New Hampshire, on whose borders grows the shrub Rhodora.

Whoever was privileged to know Professor Penhallow as a warm friend, or to meet him for only a single time, was irresistibly drawn to him by his courteous manner, his fine figure, handsome face, gentle but firm voice, and the charm of his conversation. He was a man of sterling character, firm in his convictions of what was honest and upright and fearless in expressing them, and yet withal there was a gentleness in his nature and disposition that always won friends. His knowledge

was not confined to a single branch of science, but his botanical activities were in many different fields in all of which he worked with a thoroughness always characteristic of everything he did. The extreme versatility of his scientific studies may be shown by a few examples.

In 1882 he published as Series 3, no. 2, of the Houghton Farm Experiment Department, 'Peach Yellows,' a paper dealing with vegetable pathology. In the Ninth Annual Report of the Montreal Horticultural Society, published in 1884, appeared his article 'Notes on the trees and shrubs of northern Japan,' a paper of horticultural importance. In May, 1886, the American Naturalist contained his observations on 'Variation in water in trees and shrubs,' showing the hydration of dead wood and of wood from living trees and shrubs, the latter case illustrated by studies of seventy-six species, a subject within the field of vegetable physiology. In the Canadian Record of Science, vol. ii, no. 2, April, 1886, was published 'Physical Characteristics of the Ainos.' These tribes occupy "Yezo and the Kuriles" and Professor Penhallow says that his experience extended over "four years of intimate acquaintance with these people, hundreds of whom were brought under observation." To this ethnological paper I will add one more dealing with palaeo-botany, 'Notes on the Erian (Devonian) Plants from New York and Pennsylvania,' published in the Proceedings of the United States National Museum, vol. xvi, 1893. This is enough to show the great variety of subjects that occupied his attention and were treated with a masterly hand.

David Pearce Penhallow was born at Kittery Point, Maine, on May 25, 1854, and was graduated at Amherst College, Massachusetts, receiving the degree of Bachelor of Science (B. S.) in 1873. Here he developed a passion for vegetable physiology, but he was not allowed to give himself up to this work, for not long after his graduation he went to Sapporo, Japan, to assist in founding the Imperial College of Agriculture, President William S. Clarke of Amherst being at the head of the party, and William Wheeler, now of Concord, constituting the third member. There Mr. Penhallow was Professor of botany and chemistry from 1876 to 1880, and acting President from 1879 to 1880. He was accompanied during a portion of this time by his wife who was Sarah A. Dunlap of Amherst, and whom he married on May 4, 1876. After finishing his engagement at Sapporo he returned to the United States, and soon after was appointed botanist

to the short-lived Houghton Farm in New York. This position he held during the year 1882 to 1883. Professor George L. Goodale, whom I wish to thank for some facts regarding Professor Penhallow, says, "This experimental farm began its work under the most favorable auspices and presented a capital chance for investigations in plant life. Professor Penhallow did first-class work at this point, but, suddenly, in a spasm of economy, the projector of the enterprise gave it up, and sent him adrift." Professor Goodale offered him the hospitality of the Harvard Botanic Garden and the University Laboratory, and he also had the summer school class in botany.

In 1883 he accepted the position of Professor of Botany at McGill University in Montreal. Here he had general classes in botany, but there was not much opportunity for physiological work. The late Sir John William Dawson, the Canadian geologist and naturalist, and at that time Principal of McGill University, turned him over to palaeo-botany and the little leisure he had was given up to that part of the field. He held his position there for twenty-seven years until his death. The University conferred upon him the degree of Master of Science (M. S.) in 1896, and that of Doctor of Science (D. S.) in 1904. It was during this period, in 1888, that Boston University gave Professor Penhallow the degree of Bachelor of Science (B. S.).

His published works were written mainly during his life at McGill University, and some idea of their extent can be formed from the fact that his publications on botanical subjects alone, chiefly relating to palaeo-botany, comprise about one hundred and fifty titles, while his reputation as a scholar, a director and an organizer is shown in the many honorable positions he held in societies and institutions of note both at home and abroad.

During the past few years he was very active in establishing a Biological Station at St. Andrews, New Brunswick, and to this task he devoted his very best energies and strength. Much of the work came during the vacation period and this in connection with his regular duties was too much for him. His wonderful physique could not endure this strain.

It was early in December, 1909, that he fell ill, but he manfully labored to regain his health which had always been so robust that the strenuous climbs and tramps that many shrink from were a pleasure and exhilaration to him. He went with his wife in late December to South Carolina, and in early spring they returned north to Shel-

burne, New Hampshire, leaving there in July for Kittery Point, Maine. He was gradually regaining strength, and at one time even hoped to resume work in the fall. As the time, however, approached, it was clearly impossible, and he was granted a year's leave of absence. On October 14, Professor and Mrs. Penhallow sailed from Montreal for England, intending to settle in Cornwall where a complete change and rest would, it was confidently believed, restore him to health. His friends little realized that they should never see him again. While still at sea on October 20, five days' sail from Liverpool, he died and, though we all mourn the death of a valued member of our Club and some of us of a warm and cherished friend, yet we can rejoice that his record is one of a life well spent in increasing the world's knowledge of botanical science, and we can be proud that Professor David Pearce Penhallow was connected so long with us.

A NEW SPECIES OF SCIRPUS FROM MASSACHUSETTS AND NEW JERSEY.

M. L. FERNALD.

IN June, 1910, the writer received from Mr. Witmer Stone of the Academy of Natural Sciences of Philadelphia a *Scirpus* from the New Jersey Pine Barrens, with the following self-explanatory communication:

"Last year at about this time I found a *Scirpus* — just one plant — that recalled *S. atrocinctus* but seemed to differ in several particulars. In spite of numerous efforts I failed to find any more until now, when I have just found about an acre of it at another locality (near Williamstown Junction on the Atlantic City R. R.). I am sending you some fresh specimens for your opinion but fear they will be dried out when they reach you. I can, however, send herbarium specimens later if you desire them. *S. atrocinctus* we get only up on top of the Alleghanies and the Pocono Mountains and it blooms *much* later than this. I should thank you very much for your opinion of this Pine Barren plant. If it *is atrocinctus* it is a very remarkable occurrence. I might say that the black bands were distinctly glutinous on the growing plant."

As feared by Mr. Stone the specimens, when they reached Cambridge, were dried out so that a close study of the plant, which seemed like an extreme variant of *Scirpus atrocinctus*, was deferred until the receipt of well pressed and characteristic material in the autumn. A preliminary examination showed the Pine Barren plant to have several differences from *S. atrocinctus*, but with only a single collection at hand the writer was inclined to regard it as a pronounced southern variety of that boreal species. Upon further communication with Mr. Stone it was learned that Mr. Bayard Long of the Philadelphia Academy had made a thorough study of the plant and would soon forward his results to Cambridge.

In the mean time, in sorting the *Cyperaceae* contained in the herbarium of Mr. Charles E. Faxon, recently presented to the Gray Herbarium, the writer's attention was arrested by one specimen so strongly suggesting the New Jersey material that it was examined in detail and found to have the same large stature, glutinous black bases to the involucral leaves, long pedicels, spikelets, scales and anthers, and the distinctive dark-reddish achenes of the Pine Barren plant. Mr. Faxon's plant was collected in Boston in the early days of his botanizing and, though the label contained no more definite data, it was sufficient to stimulate a fruitful inquiry. Accordingly, when that indefatigable explorer of the Charles River system, Mr. Fayette F. Forbes, called next day at the Gray Herbarium, he was shown the new plant and in the evening telephoned: "The new *Scirpus* grows on the Charles River meadows at Dedham, on our Brookline water-works land. I think it is abundant there; at least I have always collected it there as *S. atrocinctus*." The next evening, at the December meeting of the New England Botanical Club, the writer, now further reinforced by flowering and fruiting sheets from Mr. Forbes which showed beautifully all the characteristics of the Stone and the Faxon specimens, exhibited the plant as a new species likely to be found elsewhere in southern New England.

In a few days came a very valuable detailed letter from Mr. Long emphasizing the specific claims of the plant and followed by a suite of specimens from the Williamstown Junction station and from Andrews, on the Great Egg Harbor River. These were perfectly characteristic and renewed the already well grounded conviction that we were dealing with a very distinct but undescribed Wool Grass. As indicated by the notes prepared by Mr. Long during the winter of 1909–10, he had already worked out the specific characters of the

plant and its relation to the more northern *S. atrocinctus;* and, since Mr. Long has on other occasions shown keen discrimination in his study of the *Cyperaceae,* it is a pleasure permanently to associate his name with the new

SCIRPUS **Longii** n. sp. Planta robusta; culmis 9–14 dm. altis ad nodos lucidis; foliis viridibus vel glaucescentibus 3–8 mm. latis marginibus carinulaque serrulatis, basilaribus copiosis confertis basi plus minusve nodulosis, caulinis remotis; cyma umbelliformi irregulariter supra decomposita saepissime opulenta 1–1.8 (rare 3) dm. alta, radiis scaberrimis, longioribus 2–6 erectis, brevioribus numerosis patentis vel arcuatis; involucro 2–3-phyllo, phyllis umbella brevioribus vel eam subaequantibus basi nigrescentibus glutinosisque; involucellis nigrescentibus; spiculis ellipsoideis obtusis 4–8 demum 6–10 mm. longis, lateralibus longe pedicellatis; squamis nigrescentibus carinato-convexis oblongis obtusis 2–3 mm. longis; setis albescentibus subtilissimis tardius longe exsertis crispo-flexuosis glabris; stylo exserto pertenui longe trifido, ramis 1–1.5 mm. longis; antheris linearibus 1–2 (rare 2.5) mm. longis; achenio ellipsoideo-obovoideo trigono circa 0.5 mm. longo castaneo vel badio.

Plant robust: culms 9–14 dm. high, lustrous at the nodes: leaves green or slightly glaucous, 3–8 mm. wide, serrulate along the margins and the narrow keel; the basal numerous and crowded, more or less nodulose toward the base; the cauline remote: cyme umbelliform, irregularly decompound, usually very full, 1–1.8 (rarely 3) dm. high: rays scabridulous; the longer 2–6, erect; the shorter numerous, spreading or curved: involucre of 2–3 leaves; these shorter than or about equaling the umbel, blackish and glutinous at base: involucels blackish: spikelets ellipsoid, obtuse, 4–8, becoming 6–10, mm. long; the lateral long-pediceled: scales blackish, carinate-convex, oblong, obtuse, 2–3 mm. long: bristles whitish, extremely slender, finally long-exserted, crisp-flexuose, glabrous: style exserted, deeply trifid, the branches 1–1.5 mm. long: anthers linear, 1–2 (rarely 2.5) mm. long: achene ellipsoid-obovoid, trigonous, about 0.5 mm. long, chestnut- or reddish-brown.— Meadows, swamps and fresh marshes, often in shallow water, Norfolk County, Massachusetts, and Burlington and Camden Counties, New Jersey. TYPE: northeast of Andrews, along Great Egg Harbor River, Camden County, New Jersey, June 18, 1910, *Bayard Long,* no. 4014 in Gray Herb. (duplicate in Herb. Acad. Phila.). Other material studied from MASSACHUSETTS: Boston, *C. E. Faxon;* swamp, Chamberlain lot, Dedham, June 3, 1900 (fl.), *F. F. Forbes;* damp ground, Charles River Meadows, Dedham, June 26, 1908 (old fruit), *F. F. Forbes.* NEW JERSEY: edge of the Pine Barrens, growing in water, Sicklerville (= Andrews of Long's label), June 18, 1910, *Witmer Stone;* Andrews, June 18, 1910, *B. Long,* no 4008*a* (form with condensed inflorescence); southwest of Williamstown Junction, June 18, 1910, *W. Stone, B. Long,* no. 4039.

Scirpus Longii is quickly distinguished from all its allies by its reddish brown or castaneous achenes, all the other species — *S. cyperinus* (L.) Kunth, *S. Eriophorum* Michx., *S. pedicellatus* Fernald, and *S. atrocinctus* Fernald — having whitish or cream-colored, at most buff, achenes. From *S. atrocinctus*, which it suggests in its blackish-based involucre, and blackish involucels and scales, it is further distinguished by the glutinous base of the involucre; the longer usually blacker scales (those of *S. atrocinctus* being 1.5–2 mm. long); the longer often paler bristles which, as expressed by Mr. Long, give the inflorescence a "shaggier" appearance; the longer filaments; and the longer anthers, 1–2, rarely 2.5 mm. long (those of *S. atrocinctus* being 0.3–0.5 mm. long); and by the style-branches 1–1.5 mm. long (in *S. atrocinctus* 0.5–0.75 mm. long). *S. Longii* is also a more robust plant, with a larger inflorescence and longer spikelets than are ordinarily seen in *S. atrocinctus*, though in these characters it is approached by the somewhat obscure *S. atrocinctus*, var. *grandis* Fernald. As stated by Messrs. Long and Stone *S. Longii* matures somewhat earlier than *S. atrocinctus*, the New Jersey material of the former having mature achenes on June 18 (and presumably earlier); while *S. atrocinctus* at its southernmost stations, on the mountains of Pennsylvania, is considerably later. In eastern Massachusetts, this difference is also well shown, Mr. Forbes's material of *S. Longii* collected on June 26 having the scales about half gone; while *S. atrocinctus* in the same state of development is collected in Middlesex County from July 15–20.

The following extract from a letter from Mr. Long will be of interest to students of the New Jersey flora.

"The most abundant general locality known to us is that from which Mr. Stone sent you material. I think he probably called it Sicklerville [Camden Co., N. J.]. On my printed labels it (or rather the *two* stations) are called Andrews. We collected the *Scirpus* from two large stations n. e. of Andrews, along the Atlantic City R. R. (Williamstown Br.). I also have material from a third bog s. w. of Williamstown Junc., along the same railroad and in the same region as the other two..... In all these stations fruiting plants were extremely abundant, covering the bogs solidly over large areas to the exclusion of other species. But in our two other localities, though stools of apparently the same plant were common, only a single fruiting culm was found at each. Probably this was due merely to seasonal variation in abundance of flowering. The one specimen is *Stone* 11594, with the label reading: 'Bog along Wading River midway between

Jones' Mill and Speedwell,' with the date July 9, 1909. The other, my own 4273 from Winslow Junc., south along A. C. R. R., on Pennypot Stream (branch of Great Egg Harbor River), June 23, 1910. This gives stations a little more than twenty miles apart, and on two of the larger rivers of N. J. All the localities are distinctly pine-barren. Probably our plant is another peculiar pine-barren form."

"The habitat is quite characteristic. All five stations are similar. It might be called an open pine-barren marsh, scarcely 'bog.' It is the peculiar open area in the pines, supporting commonly only herbaceous vegetation and surrounded by thickets and woods, that occurs mostly along or in the vicinity of the bigger streams. It is not characteristically sphagnous and the vegetation is mostly rank. In spring it is generally quite flooded, but dries out during the summer. The *Scirpus* at Andrews was in a foot, or probably more, of water."

One of the most interesting points in regard to this new *Scirpus* is, that by the Philadelphia botanists it is considered a very typical member of the Pine Barren flora, being confined in their region to a small area of Pine Barren country; and that it is as yet unknown elsewhere except along the Charles River in eastern Massachusetts. The latter region, with the adjacent valleys of the Neponset, Concord, Mystic, and other small rivers, marks nearly or quite the northeastern limit of many plants, local with us but by no means so rare in New Jersey,— *Lilium superbum, Spiranthes Beckii, Sagina decumbens, Draba caroliniana, Cassia Chamaecrista, Crotalaria sagittalis, Polygala Nuttallii, Ilex glabra, Rotala ramosior, Ludvigia sphaerocarpa, Proserpinaca pectinata, Hydrocotyle umbellata, Cuscuta arvensis, C. compacta, Lycopus rubellus, Eupatorium rotundifolium, E. aromaticum, Aster spectabilis, Coreopsis rosea,* etc., etc.— and most of these species are found at scattered (or sometimes numerous) stations, chiefly on the Cretaceous or Tertiary sands and clays, in southern New England, on Long Island or on Staten Island. It is, then, reasonable to suppose that *Scirpus Longii* is to be classed with them as a member of the Pine Barren flora which extends, in somewhat reduced abundance, well beyond the southeastern Coastal Plain into the more sterile districts of coastwise New England.

Gray Herbarium.

THE SUBTERRANEAN ORGANS OF CINNA ARUNDINACEA.

Agnes Chase.

(Plate 85.)

In October of 1910, Mr. Thomas L. Cooper of Decatur, Georgia, sent to the Department of Agriculture a box containing clusters of moniliform underground organs with young plants attached by thread-like rootstocks. These were identified as belonging to some grass, the "bulbs" being much swollen and greatly shortened internodes, the constricted portion being the node, but we knew of no grass having such an underground habit. When shown the specimens on his return from Mexico Prof. Hitchcock suggested *Cinna arundinacea* L. as the species producing the curious organs. Herbarium specimens of this species showed many of the culms to have slightly swollen bases.

Late in November a colony of Cinna in Virginia near the Potomac River was visited and specimens secured with clustered culms, each with a swollen corm-like base, as in *Panicum bulbosum*, and, less conspicuously, in several species of Melica. These swollen bases consisted of one to three (mostly one) internodes, constricted at the node above and below. No moniliform organs were found, but the soil was a heavy clay and it is possible the delicate connecting runners were broken, nor was the colony a large one. The specimens secured, however, served to identify the species with those sent from Georgia. A second supply of the underground organs attached to more developed plants was kindly sent by Mr. Cooper in December. The soil surrounding them was loose and sandy which may account either for the great development of these organs or for their being obtained attached to the plants.

These may be regarded as corms, constricted at the joints. They consist of two to five joints, 5 to 10 mm. in the greatest diameter, and produce rootlets and rootstocks or runners from the nodes. It is not certain how these moniliform corms are formed but they would seem to be the bases of old culms from which the aerial portion has entirely disappeared, since each is tipped by a very hard remnant of apparently an unswollen joint. Sometimes two or three of these moniliform corms are united in a cluster by very short rootstocks.

In cross section these are shown to have a loosely cellular structure, consisting of thin-walled parenchyma, with a few slender, scarcely lignified vascular bundles interspersed. Mr. C. S. Hudson examined these corms and states that they contain no starch. We have not as yet obtained a sufficient quantity to enable him to determine the chemical nature of the cell contents.

The connecting rootstocks or runners are 3 to 10 or 15 cm. long, about 1 mm. thick, obscurely angled, with irregular internodes, and sparingly branching or simple. The thin scales are often reduced to shreds.

The illustration shows one of the moniliform corms with runners connecting it to young plants. Two very young buds may be seen at the nodes and a third short runner with a slightly swollen internode at the end.

The habit here shown is unlike that of any grass so far as we know, *Panicum bulbosum* H. B. K. most nearly approximating it. At first sight these moniliform corms suggest some pathological condition or that the swellings may be occupied by nematodes but a dozen or more of these corms were dissected without finding either worms or diseased tissue.

It would be greatly appreciated if local botanists will examine colonies of either species of Cinna for these subterranean organs and send specimens fresh if possible to the writer at the Department of Agriculture.

Bureau of Plant Industry, Washington, D. C.

ERUCASTRUM POLLICHII ADVENTIVE IN AMERICA.

B. L. Robinson.

The difficulty which has been experienced in ascertaining the precise dates and places at which some European plants, such as *Lactuca Scariola* L., *Sisymbrium altissimum* L., *Brassica juncea* (L.) Cosson., etc., now widely distributed as weeds in America, first reached our continent, suggests the desirability of putting promptly on record the appearance of such related species as may be discovered getting a foothold upon American soil, for these also may in future become equally important elements in our flora.

Some five years ago Mr. William Finger sent to the Gray Herbarium for identification a *Sisymbrium*-like crucifer, which he had collected, 18 October, 1903, along the tracks of a suburban electric line, just beyond the city-limits of Milwaukee. On comparison with European specimens in the Gray Herbarium the plant was determined by the writer as *Diplotaxis bracteata* Gren. & Godr. At the time there appeared to be no record of any other American occurrence of this species, and its single appearance at Milwaukee, a manufacturing and shipping center, seemed too casual to warrant published record.

Some weeks ago Miss Martha Louise Loomis of Sherborn, Massachusetts, sent to the Gray Herbarium for determination another specimen of the same species. It was one of two individuals, which she had discovered and collected in gravelly soil beside the railroad at Sherborn, 4 September, 1910. This second station, at a great distance from the first, suggests that the species is likely to turn up elsewhere in America, possibly to spread and become established in the manner of its near relatives *Diplotaxis muralis* (L.) DC. and *D. tenuifolia* (L.) DC. Though the plant is not yet so firmly fixed as to justify its inclusion in our manuals, there seem to be grounds for putting its American occurrence on record and assembling for the convenience of local botanists its rather extended synonymy. From the latter it will be seen that recent and excellent European authorities are inclined to recognize the validity of the genus *Erucastrum* and maintain it as a convenient disposition for a dubious group of plants which, though in most respects similar to *Diplotaxis*, lack the double row of seeds characteristic of that genus. This view being accepted and the international rules of nomenclature applied, the species may be recorded as follows:

Erucastrum Pollichii Schimp. & Spenn. Fl. Frib. iii. 946 (1829); Coste, Fl. Fr. i. 80 (1901); Garcke, Fl. Deutschl. ed. 20, 345, f. 1064 (1908); Schinz & Keller, Fl. d. Schw. ed. 3, 237 (1909). *Sisymbrium Erucastrum* Poll. Hist. Pl. Palat. ii. 284 (1777). *Brassica Erucastrum*, *β ochroleuca* Gaud. Fl. Helv. iv. 381 (1829). *E. inodorum* Reichenb. Fl. Excurs. 693 (1830), and Ic. Fl. Germ. ii. t. 89, f. 4428 (1837 8). *Sisymbrium hirtum* Host. Fl. Aust. ii. 261 (1831). *Brassica ochroleuca* Soy.-Will. Ann. Sci. Nat. ser. 2, ii. 116 (1834). *Sisymbrium gallicum* Schleich. ex Soy.-Will. l. c., in synon. *Diplotaxis bracteata* Gren. & Godr. Fl. Fr. i. 81 (1847); Rouy & Fouc. Fl. Fr. ii. 44 (1895). *Brassica obtusangula*, var. *β Pollichii* Archang. Comp. Fl. Ital. 45 (1882), and ed. 2, 267 (1894). *Erucastrum bracteatum* St. Lag. in Cariot, Etude d. Fl. ed. 8, ii. 54 (1889).— Annual, erect or ascending,

2–4 dm. high, with habit somewhat as in *Sisymbrium altissimum*; stem retrorsely pubescent, the hairs being simple; leaves oblong in general outline, deeply pinnatifid to decidedly bipinnatifid, the lobes rounded, the sinuses broad and usually obtuse or truncate; racemes at length elongated, loose, the pedicels slender, ascending or so widely spreading as to be nearly horizontal, in fruit 6–10 mm. long, the lower ones subtended by distinct (though much reduced) leaves or leaflike bracts; flowers of medium size; petals pale yellow, 5 mm. in length; pods linear, subterete, 2.5–3.5 cm. long, 1–2 mm. in thickness, tipped with a slender style about 3 mm. long; seeds essentially in a single row in each cell.— Widely distributed in Central and Western Europe; adventive along railways, Milwaukee, Wisconsin, *Wm. Finger*, and Sherborn, Massachusetts, *Miss M. L. Loomis*.

Little difficulty should be experienced in recognizing this species, for its characteristic bracts, though not specially conspicuous, are readily seen and form a feature unusual in cruciferous plants.

Gray Herbarium.

POPULUS VIRGINIANA AND P. ANGULATA.

H. H. Bartlett.

In American botanical works it is customary to include in the synonymy of *Populus deltoides* several names which are maintained in Europe for trees of marked specific characters. Thus, Schneider [1] distinguishes three species, *Populus deltoides*, *P. monilifera* and *P. angulata* in place of the *P. deltoides* of our manuals. In his Elysium Marianum, Mr. Tidestrom [2] maintains the first and second of these three as distinct (under the names *Aigeiros deltoides* and *A. virginiana*) but the third is not recognized in any current American work. Last October the writer found *Populus virginiana* and *P. angulata* growing abundantly on both the South Carolina and Georgia sides of the Savannah River, at Augusta. They were so clearly different species that specimens were collected for identification by Mr. Tidestrom, who is now studying the poplars.

[1] Illustriertes Handbuch der Laubholzkunde, i, pp. 7–9 (1904).
[2] Elysium Marianum, iii, part 13, pp. 16–17 (1910).

The best account of *Populus angulata* is that of Michaux f.[1] According to his Histoire des Arbres this tree occurs from lower Virginia through the Carolinas to Georgia, from the mouth of the Mississippi to the Missouri, and up the latter river a distance of a hundred miles. It is characteristic of the muddy banks of streams which are subject to overflow.

In the region of the lower Mississippi, *Populus angulata* is associated with a similar and very closely related tree which Michaux f. described under the name *P. canadensis*, although it seems not to be the same as the *P. canadensis* of authors earlier than he. *Populus angulata*, the Carolina poplar, and the *P. canadensis* of Michaux f., the cottonwood of the middle West, differ from *P. deltoides* and *P. virginiana* in having remarkable cork wings on the twigs and younger branches. These are arranged in a definite geometrical pattern; — at the insertion of each petiole one wing runs directly downward, and two others, which lie parallel to the first, on either side of it, form an arch with the petiole at the apex. Above each petiole (or bud, or twig, as the case may be), a cork wing turns obliquely aside and ends abruptly. The wings persist on the branches and trunk for several years, until they are obliterated by the fissuring of the bark. Michaux states that his *P. canadensis* is rare in the Atlantic states, most common on the Mississippi, Arkansas and Missouri Rivers and their affluents. He mentions having seen the tree in the East along the Genesee River, in New York (specimens more than a meter in diameter), in certain parts of Virginia (localities not specified), and notably on many islands of the Ohio. Michaux says that its ability to withstand intense cold proves its distinctness from *P. angulata*,— a tree so tender as to be damaged by frost even in the climate of Paris. Aside from the fact that the trees have an entirely different aspect, he says that they can easily be told by their buds; those of *Populus angulata* are short, very green, and not aromatic-resinous, as are those of *P. canadensis*. Both plants deserve the attention of botanists.

The trees of *Populus angulata* at Augusta have leaves which are several times as large as those of *P. virginiana*,— another character which confirms the distinctness of the two. Even *P. virginiana* itself, however, is so little known to our botanists that a new piece of evidence that it is distinct from *P. deltoides* will be of interest. Mr. M. A. Carlton,[2] in his studies of the rusts of willow and cottonwood,

[1] Histoire des Arbres, iii. pp. 302–305 (1813.)
[2] Bull. 63 Bur. Plant Industry, U. S. Dept. Agric., p. 19 (1904).

found that "the cottonwood most common in Washington, known as the South Carolina poplar, could not be infected by the uredo form [of *Melampsora sp.*] from the common Western cottonwood, although these two poplars are classed by some as being the same species. Moreover, the rust does not occur in nature on the South Carolina poplar, but is very abundant on the Western cottonwood, and even occurs in Washington on the few individual trees of that type growing in the city." The cottonwood most common in Washington, "known as the South Carolina poplar," is *P. deltoides*. The few trees of the other, called by Mr. Carleton "the Western cottonwood" are the same individuals upon which Mr. Tidestrom based his report of *P. virginiana* "in cultivation."

Doubtless our poplars hybridize extensively. This fact renders their study difficult, especially if herbarium material only is dealt with. Botanists who are favorably situated to do so, would, I am sure, confer a great favor upon Mr. Tidestrom by communicating to him poplar specimens and notes concerning them.

Bethesda, Maryland.

Notes on Botrychium from Tennessee.— The occasion of these notes on the Genus *Botrychium* was the finding of a peculiar teratological specimen of *obliquum* Muhl. Upon the sterile frond there are several pinnae which bear groups of well developed sporangia. In every case in which there are several sporangia together a definite rhachis connects them. This rhachis is composed of a portion of the frond which is slit out of the leafy tissue. A line of tissue of lighter green color than the rest, runs out to this rhachis. The sporangia are perhaps a little smaller than the average of the sporangia that are borne on the fertile frond, and the spores are between four and five percent smaller than the normal. The viability of the spores was not tested, but in appearance they were in no appreciable way different from the normal. There was only the one plant of the species found in the locality, which was not far from Knoxville.

This species does not seem to be very common in the parts of East Tennessee which have been examined by the writer, and there are only three specimens of the plant from the entire state in the university herbarium. Two of these are from Middle Tennessee and the other from West Tennessee. The writer has collected it from only one other

place in this section of the state in addition to the one described above, and in both of these localities it was found very sparingly.

The only other species of *Botrychium* from Tennessee represented in the herbarium is *B. virginianum* (L.) Sw. There are specimens from each of the grand divisions of the state, and the writer has gathered it near Knoxville. The plant now classified as *B. obliquum* var. *dissectum* (Spreng.) Clute is reported by Gattinger in his Flora of Tennessee as occurring with these two, but there are no specimens of this variety in his collection which forms a part of the university herbarium.— Ernest Shaw Reynolds, University of Tennessee, Knoxville, Tennessee.

An Important Publication on Lichens.— New England botanists who would like to have some knowledge of our lichens, but who have been prevented by lack of literature will welcome the publication of Prof. Bruce Fink's "Lichens of Minnesota." [1] The work consists of a general introductory account of the structure and reproduction of lichens, followed by a descriptive catalogue, furnished with copious keys, and illustrated with photographs of unusual excellence. Each species is described at some length, and notes as to habitat and geographical range are added. It should be understood, however, that this is not a popular handbook, doing for the lichens what Dr. Grout's serviceable "Mosses with a Hand-Lens" does so well for that group. Prof. Fink has not intended to prepare a popular work, and it is doubtful if such a book would be satisfactory, since the classification of lichens must necessarily be based upon microscopic characters. Unless he has access to an herbarium, the path of the beginner in the study of lichens is not an easy one, at best, but with a microscope at one's disposal, with the patience which all scientific work requires, and with Prof. Fink's book, one is better equipped than has ever before been the case. Of the 439 species and varieties found in Minnesota, over 300 occur also in New England, and while there are some of our familiar New England lichens which do not extend so far west as Minnesota, the work is the most convenient manual available for students throughout the northeastern states. For the specialist this publication is of great significance, as it represents the culmination of fourteen years of careful work, with the matured views of Prof. Fink concerning the considerable number of species which he treats.— L. W. Riddle, Wellesley College.

[1] Fink, Bruce. The Lichens of Minnesota. Contributions from the U. S. National Herbarium, vol. 14, part 1, pp. 1–269, with 51 plates and 18 text-figures. Published by the Smithsonian Institution, Washington, D. C., June 1, 1910. A few copies may be obtained from the Superintendent of Public Documents, Government Printing Office, Washington, D. C., at fifty cents each.

A New Textbook of Botany.[1]— The need of a book such as that of Messrs. Coulter, Barnes and Cowles has long been evident and the uniformly high standard maintained throughout the volume will ensure a cordial welcome and extensive use. It is thoroughly modern in treatment, accurate in statement and attractive in appearance. The authors' conception of their task is the selection of "the fundamental facts and principles of the science." Their "endeavor has been to help the student build up a coherent and substantial body of knowledge, and to develop an attitude of mind which will enable him to grapple with any botanical situation, whether it be teaching or investigation." From this standpoint the book will appeal strongly to teachers, whose chief complaint is that textbooks contain too much material and lay too little emphasis on the selection of what is really important.

The treatment of the selected topics is in general clear and well proportioned. Certain matters are presented with a degree of finality which may occasion surprise, e. g. the statement that "transpiration far from being a function of plants is an unavoidable danger" (p. 326). One may suppose that the skilful teacher will know how to utilize such a statement to provoke thought and discussion.

A noteworthy feature is the large number of very excellent illustrations. A great part of these is new or taken from recent publications. In this respect the work may well serve as a model.— W. J. V. O.

[1] Coulter, J. R., Barnes, C. R, and Cowles, H. C, A Textbook of Botany for Colleges and Universities. Vol. I. Morphology and Physiology. American Book Co., 1910. viii + 488 pages.

Vol. 12, no. 144, including pages 221 to 245 and title-page of volume, was issued 2 January, 1911.

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